MANAGING QUACKGRASS INFESTATIONS AS COVER CROPS IN HERBICIDE-RESISTANT CORN

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Abstract:

Quackgrass (*Elytrigia repens* (L.) Nevski) is an invasive weed – not normally considered to be a desirable cover crop. However, its high nutritional value makes this weed more tolerable in alfalfa (*Medicago sativa* L.) than in corn (*Zea mays* L.). Growers typically attempt to eradicate quackgrass from corn fields, but manage this weed less aggressively in alfalfa, where it contributes to hay quality and yield. The objective of this study was to evaluate herbicides for use in herbicide-resistant corn which could: 1) suppress quackgrass to minimize its effect on corn silage yield, 2) leave adequate quackgrass residue to control erosion (act as a good cover crop), and 3) leave quackgrass as a grass companion crop for alfalfa. In this first year of the study, the weather was unusually dry, and the presence of quackgrass hurt corn yields in all treatments. Quackgrass did, however, provide sufficient ground cover in many of the treatments.

Introduction:

The perennial and pernicious weed quackgrass (*Elytrigia repens*) can be a costly and difficult weed to control in field corn. Typical weed control programs (such as low rates of atrazine and pendimethalin) do little or nothing to control quackgrass. Herbicides which do successfully manage this weed, such as glyphosate, must generally be applied prior to corn planting or following harvest, incurring the additional costs of chemical, fuel, and equipment wear. Cultivation is not particularly effective at controlling quackgrass, and the physical action of breaking up the rhizomes may simply help spread the quackgrass throughout the field. Growers with severe quackgrass infestations have sometimes asked whether the quackgrass might be managed as a low-cost cover crop, providing erosion protection, a potential winter pasture or hay crop (Greub et al., 1986; Christen et al., 1990), and saving both herbicide costs and corn yield loss. Though the change in strategy from control to tolerance may seem strange, the potential economic and environmental benefits are numerous.

Though no-till and zone-tillage are other options, besides cover crops, for reducing erosion, the presence of a grass cover crop is known to reduce nutrient runoff from manure applications (Hamlett and Brannan, 1991), which are typically heavy in N.Y. The idea of using weeds for cover is not completely new (Parkman and Bloodworth, 1991), nor is the idea of managing a perennial cover crop (Eberlein et al., 1992). Cost, time for planting and spring plowdown, and difficulty in establishment are among the primary difficulties cited by growers in using cover crops. For these and other reasons, only about 10% of N.Y. corn growers use cover crops (Gift and Mt. Pleasant, 1997). The possibility that quackgrass might in some cases be the ultimate cheap (costing only the amount of herbicide necessary to suppress it) and easy (no seed establishment necessary) cover crop could improve that statistic. The objective of this study is to determine the feasibility of managing an existing quackgrass stand as a cover crop in corn.

Materials and Methods: This study was performed at two sites, both with heavy existing quackgrass infestations. In Dryden, N.Y., corn hybrids 'DK493GR' (glufosinate-resistant) and

‘DK493RR’ (glyphosate resistant) were planted on June 10, 2000 in a split plot arrangement in two field locations (once, on last year’s plots, and again in a fresh quackgrass stand), with corn hybrid as the main plot, and herbicide as the subplot. Late post-emergence treatments were applied to both hybrids on July 19, 2000. Treatments included an untreated check (both hybrids), glufosinate (0.37 and 0.44 lb ai/A) (GR only), glyphosate (1.0 lb ai/A) (RR only), primisulfuron (0.57 oz ai/A) (RR only), and nicosulfuron (0.50 oz ai/A) (both hybrids). In Valatie, N.Y., ‘DK493SR’ was also included, as well as the additional treatments sethoxydim (0.19 and 0.28 lb ai/A) (SR only). Untreated check and nicosulfuron treatments were also applied to SR corn. Corn in Valatie was planted on May 17, 2000, and herbicides were applied on June 23, 2000. Response variables include quackgrass ratings, corn ratings (including yellowing and leaf rolling, due to drought conditions) and corn silage yields.

Results:

Glyphosate treatments resulted in the highest yields at both locations (9.4, 10.6 T/A in Dryden; 19.6 T/A in Valatie). In Dryden, on the new site, all treatments yielded as well as glyphosate plots. Yields of glufosinate treatments did not differ from glyphosate treatments in Valatie (19.4 T/A), but were lower than glyphosate treatments in Dryden on last year’s plots (7.4 T/A). Interestingly, last year, exactly the reverse happened – glufosinate yielded less than glyphosate in Valatie but not Dryden. Nicosulfuron was the only treatment on last year’s plots in Dryden to yield as well as glyphosate (9.3 T/A, vs. 10.6 T/A for glyphosate). In Valatie, primisulfuron and nicosulfuron treatments’ yields were not different from those of glyphosate treatments. Sethoxydim (Valatie only) yields were equivalent to the weedy check. Weedy check treatments had the lowest yields at Dryden (4.2 tons/A), and were statisically equivalent to the worst treatments in Valatie (12.2 tons/A). In-season quackgrass injury ratings for both locations indicate that yields were highly correlated with the degree of quackgrass suppression. Fall evaluations of quackgrass cover from 1999 experiments indicate that ground cover would be sufficient to prevent significant soil erosion in all but the Roundup treatments.

Discussion:

Several treatments look consistently promising for controlling quackgrass enough to maintain maximum corn silage yields without eliminating it. Nicosulfuron and glufosinate especially seem to provide adequate quackgrass control for maintaining silage yields. This spring we will look at alfalfa yields in plots with suppressed quackgrass, as well as ground cover percentages, to determine whether 1) remaining quackgrass can provide sufficient ground cover, even when quackgrass stands did not impact corn yields, and 2) quackgrass stands impede alfalfa stand establishment and yields.

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